Canadian Radio-television and Telecommunications Commission
Conseil de la radiodiffusion et des télécommunications canadiennes

Broadband Report

November 2011

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1.0 Introduction

Virtually all Canadians benefit from the availability of Internet access service, regardless of where they live, whether in urban or rural centres, or remote areas. The rollout of broadband Internet access service, over a number of platforms and technologies, has been spurred through a combination of market forces, targeted funding, and public/private partnerships at all levels of government.

Canadians have rapidly adopted Internet services. The number of Internet subscribers increased from 1.4 million in 2000 to 10.4 million in 2010. Over these years, Internet users have migrated from lower Internet access speeds to broadband speeds, (i.e. download speeds of at least 1.5 Mbps). By year-end 2010, 70% of Canadian households subscribed to Internet access service with broadband speeds.

The Commission considers that the deployment of broadband Internet access services, including deployment in rural and remote areas, should continue to rely on market forces and targeted government funding, an approach that encourages public/private partnerships. By year-end 2010, this approach expanded the 1.5 Mbps broadband footprint to encompass 98% of Canadian households and the 5 Mbps broadband footprint to 86% of Canadian households. Canadian Internet needs, in all regions of Canada, have changed and continue to change. Canadians are demanding higher speeds, higher data transfer capacity, and flexibility in the use of their fixed, mobile, and handheld devices.

In Telecom Regulatory Policy 2011-291,[1] the Commission recognized that Internet access service is an increasingly important means of communication. The Commission was of the view that it would be in the public interest to establish universal target speeds for broadband Internet access in order to ensure that all Canadians, particularly those in rural and remote areas, could benefit from a greater level of broadband connectivity. In that decision, the Commission established target speeds of 5 Mbps downstream and 1 Mbps upstream. These speeds should be available to all Canadians, through a variety of technologies, by the end of 2015. Further, the Commission noted that it would gather information from Internet service providers (ISPs) in order to monitor progress towards reaching these target speeds.

The purpose of this report is to establish a baseline from which to assess the progress that is being made in achieving this target.

[1] *Obligation to serve and other matters*, Telecom Regulatory Policy CRTC 2011-291, 3 May 2011, as amended by Telecom Regulatory Policy CRTC 2011-291-1, 12 May 2011.

1.1 Broadband data collection and coverage determination

The Commission has collected Internet access data since 1999. In 2009, the Commission started to collect data on broadband availability by download speed. Currently, broadband availability is captured at the following download speeds: 1.5 to 4.9 Mbps, 5 to 9.9 Mbps, 10 to 15.9 Mbps, 16 to 24.9 Mbps, 25 to 29.9 Mbps, 30 to 49.9 Mbps, 50 to 99.9 Mbps, and greater than 100 Mbps.

Broadband availability is generally identified at the dissemination block[2] level. Each block contains data on population, dwelling count, locality name, and prominent road names. The blocks are supplemented with broadband availability, type of broadband service (e.g. digital subscriber line (DSL), cable modem), available download speed, and companies serving the dissemination block.

Wireline broadband availability

To determine wireline broadband availability, wireline facilities-based ISPs, as part of an annual facilities survey conducted by the Commission, are issued a form requesting one of the following: (a) a map of the ISP's serving area, indicating areas where Internet service is available by download speed; if this is not available, (b) the location of Internet access equipment by type of equipment (e.g. in the case of DSL service, DSLAMs[3], or other equipment, and in the case of cable modem service, head-end locations by speed); if this is not available, (c) a list of the communities served by download speed.

The information provided is transcribed onto a map. In the case of equipment location, circles are created, using the equipment location as the centre. The radius of the circle is determined from a set of performance tables/charts. The results are then tagged to the closest dissemination block area centre point. Cable head-end data is tagged to the geographic area covered by the head-end.

Wireless broadband availability

i) Mobile

To determine mobile wireless broadband (i.e. HSPA+ and LTE)[4] availability, facilities-based wireless service providers, as part of the facilities survey, are issued a form requesting a map identifying where mobile broadband service is available.

ii) Fixed-wireless

To determine fixed-wireless broadband availability, serving area maps of fixed-wireless ISPs are extracted from their websites.

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2 A dissemination block is an area bounded on all sides by roads and/or boundaries of standard geographic areas. The dissemination block is the smallest geographic area for which population and dwelling counts are disseminated. Dissemination blocks cover all the territory of Canada.

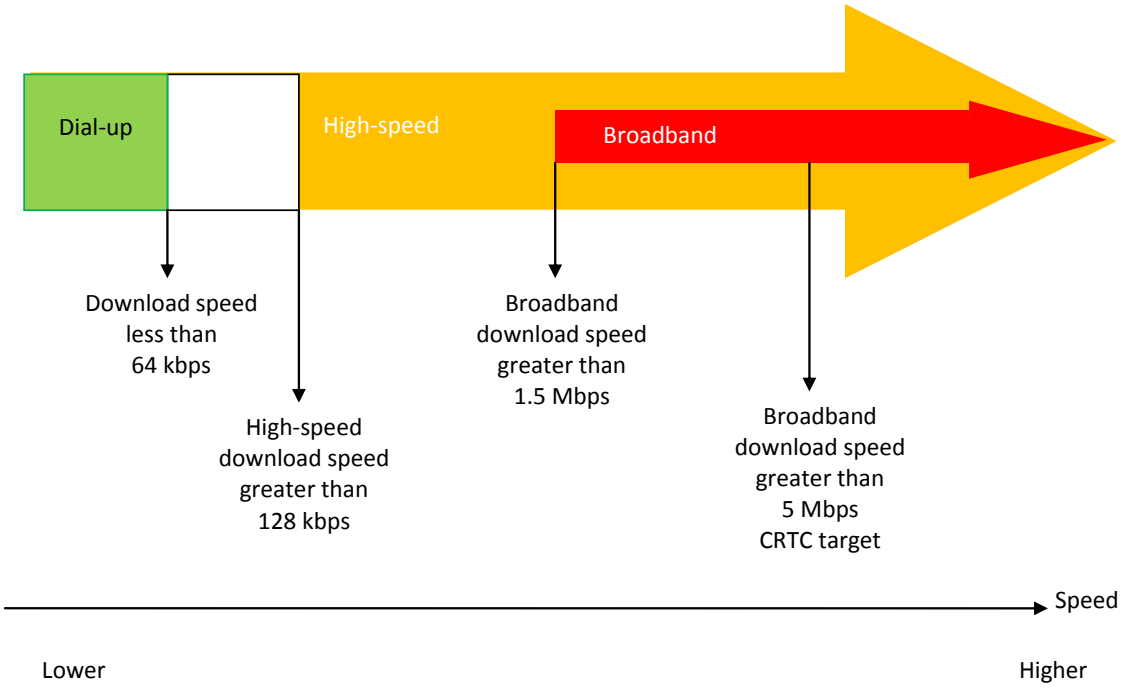
3 Digital subscriber line access multiplexer

4 Evolved high-speed packet access and long-term evolution

2.0 Broadband Internet access service

Internet access download speeds range from a low of 56 Kbps to speeds in excess of 100 Mbps. As depicted in Figure 2.0.1, speeds below 64 Kbps are generally referred to as dial-up service. Speeds in excess of 128 Kbps are referred to as high-speed. Broadband service is a subset of high-speed. In Canada, broadband service refers to download speeds of 1.5 Mbps or greater. In Telecom Regulatory Policy 2011-291, the Commission established a universal broadband Internet access target download speed of 5 Mbps.

Figure 2.0.1 Schematic representation of Internet access speeds



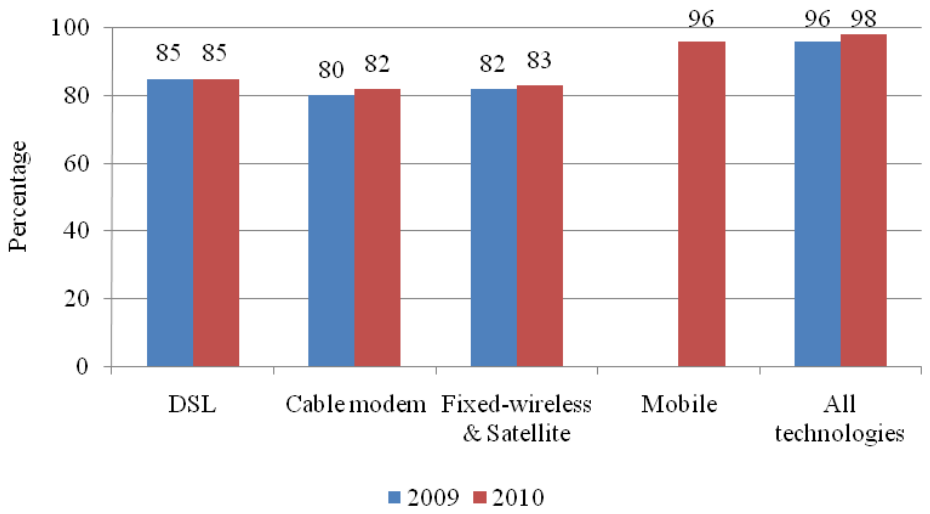
Source: CRTC

2.1 Broadband Internet access service availability

A number of technologies and platforms are used to provide broadband service in Canada. In the early years, consumers generally relied on DSL service from the incumbent telephone companies and on cable modem service from the cable companies for broadband Internet access service. Since then, other technologies have taken root. These include fixed wireless, satellite, and cellular (HSPA+ and LTE).

Figure 2.1.1 displays broadband availability in Canada as of December 2009 and December 2010, by technology. Similar data is provided in table 2.1.1 at the provincial and territorial levels for 2010.

Figure 2.1.1 Broadband availability (percentage of households, 2009 and 2010)



Source: CRTC data collection

Table 2.1.1 Broadband availability by technology and province/territory, 2010

Province	DSL	Cable modem	Fixed wireless	Mobile[1]	All technologies
British Columbia	91%	87%	73%	98%	99%
Alberta	85%	76%	95%	99%	100%
Saskatchewan	72%	61%	91%	91%	98%
Manitoba	80%	66%	82%	60%	89%
Ontario	89%	83%	93%	99%	100%
Quebec	87%	82%	79%	98%	99%
New Brunswick	80%	71%	48%	98%	100%
Prince Edward Island	77%	78%	97%	99%	100%
Nova Scotia	75%	75%	100%	98%	100%
Newfoundland and Labrador	69%	68%	23%	95%	99%
Yukon	90%	62%	0%	70%	100%
Nunavut	27%	0%	0%	0%	27%
Northwest Territories	41%	60%	0%	62%	89%
Canada	85%	82%	82%	96%	98%

1. HSPA+ only
Source: CRTC data collection

Each technology deployed in the provision of broadband Internet access service has its own set of strengths and weaknesses. The deployment of each technology is generally based on the desired service objectives and cost. Other considerations include, but are not limited to, population density and geographic considerations.

DSL availability

DSL broadband Internet access service is available in all provinces and territories. By year-end 2010, 85% of households were located within the DSL broadband footprint. On a provincial basis, the DSL broadband footprint encompassed between 72% and 91% of households. In the territories, the DSL broadband footprint encompassed 90% of the households in the Yukon, 27% in Nunavut, and 41% in the Northwest Territories.

Incumbent telephone companies have generally expanded and upgraded their DSL facilities to provide higher Internet access speeds. As the companies upgrade their facilities, they are increasing their service offerings to include IPTV service. DSL access facilities encompassed twisted pair, fibre to the node with twisted pair to the home, and fibre-to-the-home. By year-end 2010, 15% of households were served by either fibre-to-the-node or fibre-to-the-home.

Cable Modem availability

Cable modem broadband Internet access service is available in all provinces and territories except Nunavut. Approximately 82% of households are within the cable modem broadband footprint. On a provincial basis, the cable modem broadband footprint encompassed between 61% and 87% of households. In the territories, the broadband footprint encompassed 62% of the households in the Yukon and 60% in the Northwest Territories.

Cable companies have modified their network to provide higher speed Internet access service. With the deployment of newer technology, such as DOCSIS 3.0, a data compression technology that provides more efficient and economical bandwidth utilization, cable companies are introducing increasingly higher download and upload speeds of 50 Mbps and 2 Mbps, respectively. With IP technology, cable companies have expanded their service offerings to encompass telecommunications services.

Fixed wireless availability

The fixed wireless broadband footprint encompasses 82% of households in Canada. Fixed wireless is generally the preferred platform in less densely populated areas due to its lower cost of deployment relative to DSL and cable modem.

Satellite availability

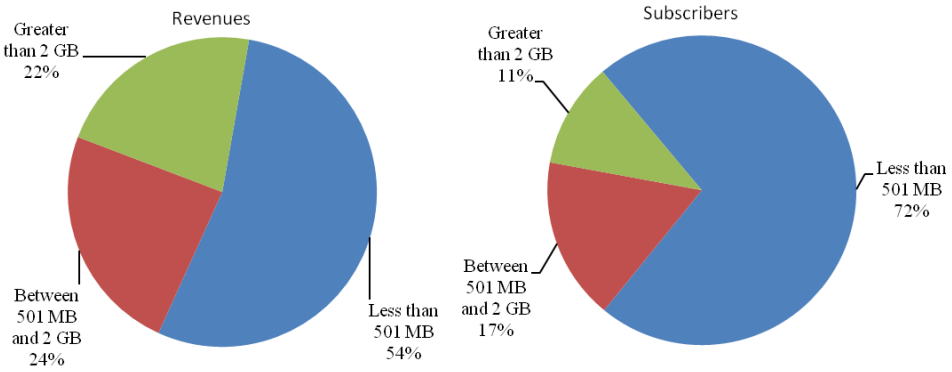
Although satellite broadband Internet access service is available throughout Canada, it is generally deployed to provide broadband Internet access service in the more rural and remote areas of the country. A number of ISPs are working with satellite technology companies to deliver fast, reliable, and affordable two-way satellite high-speed Internet service. For example, with the October 2010 launch of ViaSat-1, companies such as Xplornet Communications Inc (Xplornet) will be able to use 4G broadband satellite service to provide

Internet access service with download speeds of up to 25 Mbps to rural Canadians. Xplornet expects the satellite service to be available to Canadians in the fourth quarter of 2011.

Mobile availability

Mobile broadband Internet access service is available to 96% of Canadian households. Provincially, the mobile broadband footprint is generally clustered to encompass between 91% and 99% of Canadians, except for Manitoba (60%). Mobile carriers have deployed a number of newer technologies to provide mobile broadband service. These technologies include HSPA+ and, more recently, LTE. Companies have started to deploy LTE technology, which is expected to enable cellular providers to provide broadband Internet access service at speeds comparable to landline broadband service.

Figure 2.1.2 Mobile data-only plan revenues, subscriptions, and average monthly revenues per subscriber, by data plan capacity



Capacity:	Less than 501 MB	Between 501 MB and 2 GB	Greater than 2 GB
Average revenues per subscriber per month ($)	23	44	64

- Data-only plans include built-in and portable access devices such as hubs, sticks, dongles, laptops, etc.

Source: CRTC data collection

Table 2.1.2 Mobile broadband subscriptions

	Number of subscribers (millions)	Percentage of all subscribers
Standard mobile broadband	9.1	35%
Dedicated mobile	0.9	4%
Total mobile broadband	10.0	39%

Source: CRTC data collection

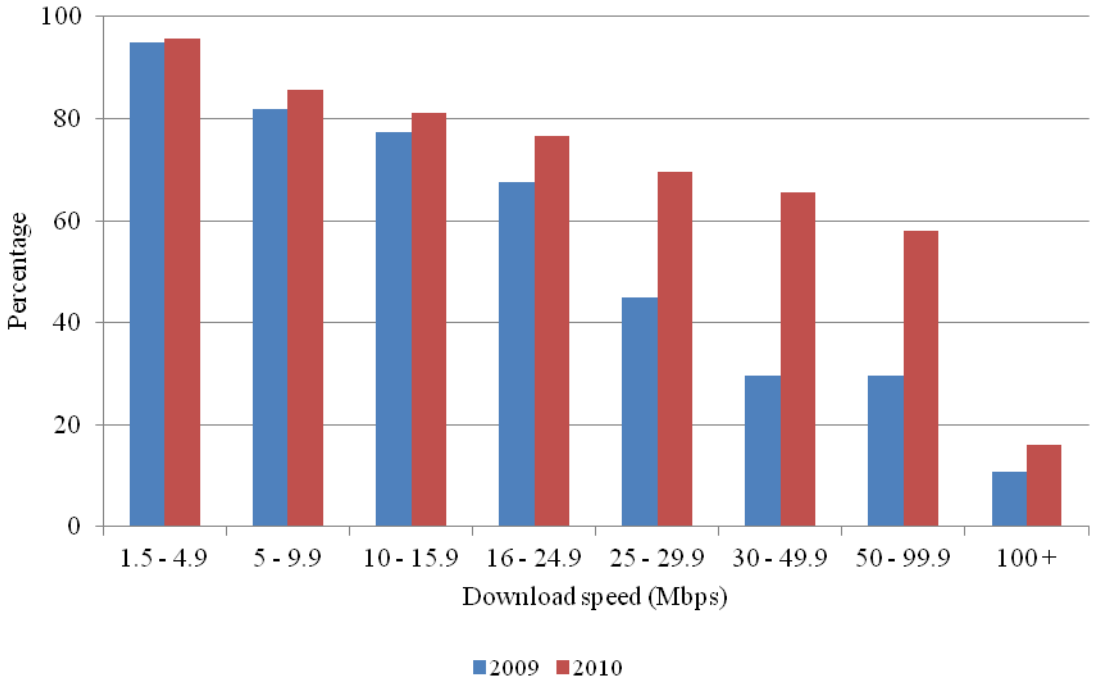
As displayed in Figure 2.1.2 and Table 2.1.2, Canadians are users of mobile data services. Thirty-nine percent of mobile subscribers use either advanced handheld devices or dedicated devices such as “rocket sticks” that connect computers to the mobile network.

2.2 Broadband Internet access service availability, by speed

With advances in technology and increased network investments, ISPs are continually increasing broadband Internet access speeds.

As displayed in Figure 2.2.1, significantly higher broadband Internet access speeds were available to more households in 2010 than in 2009. In 2010, the number of households in the 25 to 100 Mbps broadband footprint almost doubled to 9.4 million households, representing 70% of households.

Figure 2.2.1 Broadband availability, by speed (2010 v. 2009, percentage of households)



- Excludes HSPA+

Source: Industry Canada and CRTC data collection

As displayed in Table 2.2.1, broadband Internet access download speeds of up to 5 Mbps are available by cable modem, DSL, fixed-wireless and mobile (HSPA+). Cable modem and DSL are the two broadband platforms that provide download speeds greater than 5 Mbps.

Table 2.2.1 Internet access platforms, by speed and number of platforms

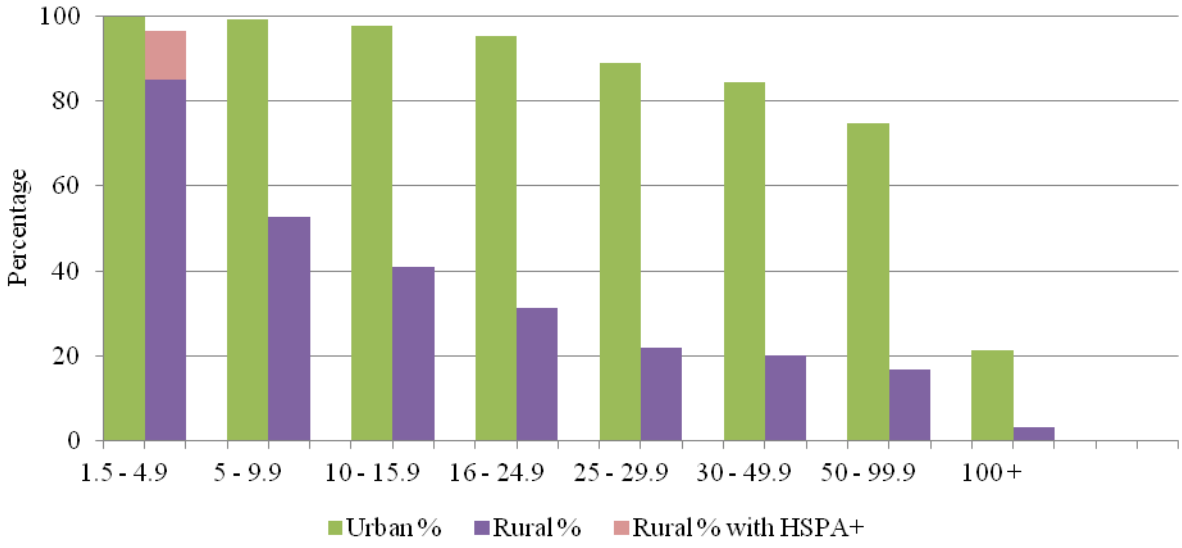
Number of platforms	1.5 Mbps to 4.9 Mbps	5.0 Mbps to 9.9 Mbps	10.0 Mbps to 15.9 Mbps	16.0 Mbps to 24.9 Mbps	25.0 Mbps to 29.9 Mbps	30.0 Mbps to 49.9 Mbps	50.0 Mbps to 99.9 Mbps	Over 100 Mbps
1	5%	14%	34%	42%	38%	58%	58%	16%
2	9%	72%	47%	35%	32%	7%	0%	0%
3	17%	0%	0%	0%	0%	0%	0%	0%
4	68%	0%	0%	0%	0%	0%	0%	0%

Note: Platforms include DSL, cable modem, fixed wireless, and mobile

With respect to choice of platforms in the 1.5 to 4.9 Mbps range, 68% of Canadian households have a choice of 4 platforms.

As displayed in Figure 2.2.2, at all broadband speed levels, urban households are much better served than rural households, except for the 1.5 to 4.9 Mbps category, whereas urban households are only slightly better served (100% availability v. 96% for rural households).

Figure 2.2.2 Broadband availability – Urban v. rural (percentage of households) (2010)



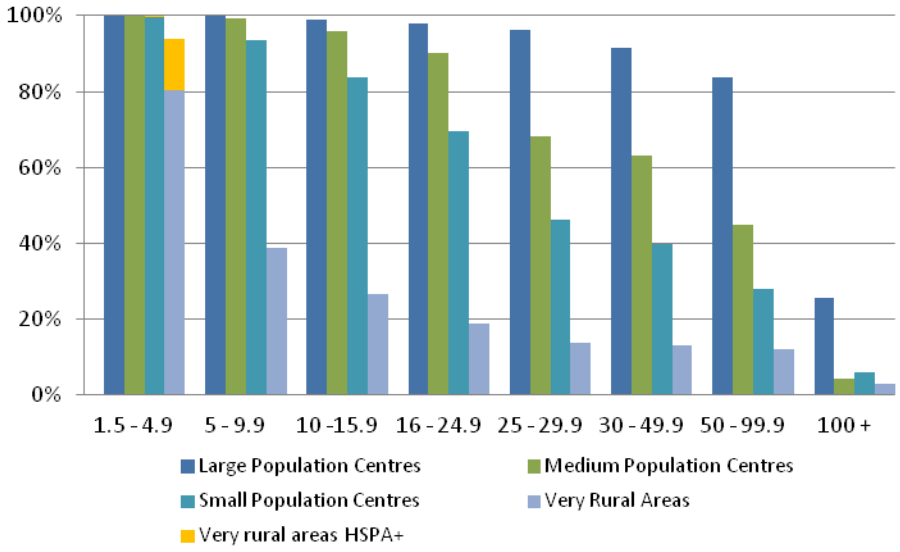
Source: Industry Canada and CRTC data collection

The inclusion of HSPA+ as an alternative to landline broadband service increases the rural broadband footprint from 85% of households to 96%, an increase of 300,000 households.

To obtain greater detail on the availability of broadband Internet access service, the population density[5] was divided as follows: large population centres,[6] medium population centres,[7] small population centres,[8] and very rural population areas.

Figure 2.2.3 displays broadband Internet access availability by speed based on population density. Availability of 5 Mbps Internet service in small centres mainly keeps pace with their larger counterparts; however, availability rapidly declines at higher speed tiers. Areas with population densities lower than 400 persons per square kilometre ("very rural areas") display an 80% availability of 1.5Mbps Internet service, and only 39% availability at 5 Mbps[9].

Figure 2.2.3 Broadband availability, by size of community and speed (Mbps)



Source: Industry Canada and CRTC data collection

The fixed-wireless and mobile platforms are generally available to 83% and 96% of households, respectively. They are generally relied upon to provide service in the rural and more remote areas. As displayed in Table 2.2.2, a number of provinces have 99% or higher broadband coverage at the 1.5 Mbps, but significantly lower coverage at the higher speeds due to the current limitations of fixed wireless and mobile platforms.

5 This metric uses the size of the built-up area instead of CMA/CAs. Small centres have a population between 1,000 and 29,999. Medium centres have a population between 30,000 and 99,999. Large centres consist of populations greater than 100,000. All population centres must have a density of at least 400 persons per square kilometre. See http://www.statcan.gc.ca/subjects-sujets/standard-norme/sgc-cgt/urban-urbain-eng.htm

6 Examples of a large population centre include Barrie and Kingston.

7 Examples of a medium population centre include Charlottetown and Belleville.

8 Examples of a small population centre include Smiths Falls and Brockville.

9 It should be noted that fixed wireless service is not rated at 5 Mbps for purposes of this report. Anecdotal reports indicate that fixed wireless systems are somewhat limited in many areas.

Table 2.2.2 Broadband availability, by speed and province/territory (2010, percentage of households)

Province	1.5 – 4.9 Mbps	5 – 9.9 Mbps	10 – 15.9 Mbps	16 – 24.9 Mbps	25-100 Mbps
British Columbia	99%	91%	90%	81%	69%
Alberta	100%	85%	84%	82%	75%
Saskatchewan	98%	73%	63%	54%	54%
Manitoba	89%	80%	58%	54%	54%
Ontario	100%	89%	85%	81%	72%
Quebec	99%	84%	80%	79%	73%
New Brunswick	100%	81%	72%	71%	71%
Nova Scotia	100%	79%	71%	50%	50%
Prince Edward Island	100%	71%	54%	44%	44%
Newfoundland and Labrador	99%	77%	64%	40%	40%
Yukon	100%	89%	62%	62%	0%
Nunavut	27%	0%	0%	0%	0%
Northwest Territories	89%	82%	52%	43%	0%

- HSPA+ is included only in the 1.5 to 4.9 Mbps speed tier
- Availability of broadband speeds greater than 25 Mbps have been combined due to the confidentiality of the data

Source: CRTC data collection

Economic action plan

As part of the Canada's Economic Action Plan, Budget 2009 provided $225 million to Industry Canada to implement a strategy to extend broadband internet access to as many unserved/underserved households as possible. By far the largest component of that strategy is the Broadband Canada: Connecting Rural Canadians Program. As result of the Program, over 214,000 additional households in 5 provinces and 1 territory will have access to broadband service. When funded projects are completed early 2012, and together with provincial and private sector initiatives, less than 2% of households will remain without broadband access at a minimum speed of 1.5 Mbps. Table 2.2.3 displays, the number of addition households and projects for the provinces and territory benefiting from the program.

It is expected that by 2013 broadband availability would have increased from 98% in 2010 to 99%.

Table 2.2.3 Impact of the economic incentive plan on the availability of broadband service, by province/territory

Province/territory	Number of households impacted	Number of projects	Broadband availability (percentage of households)	
			2009	2012(est)
British Columbia	14,650	26	94%	96%
Alberta	40,988	11	97%	100%
Manitoba	30,984	9	92%	96%
Ontario	13,505	13	98%	98%
Quebec	112,923	25	92%	97%
Northwest Territories	1,054	2	83%	95%
Program total	214,104	86		

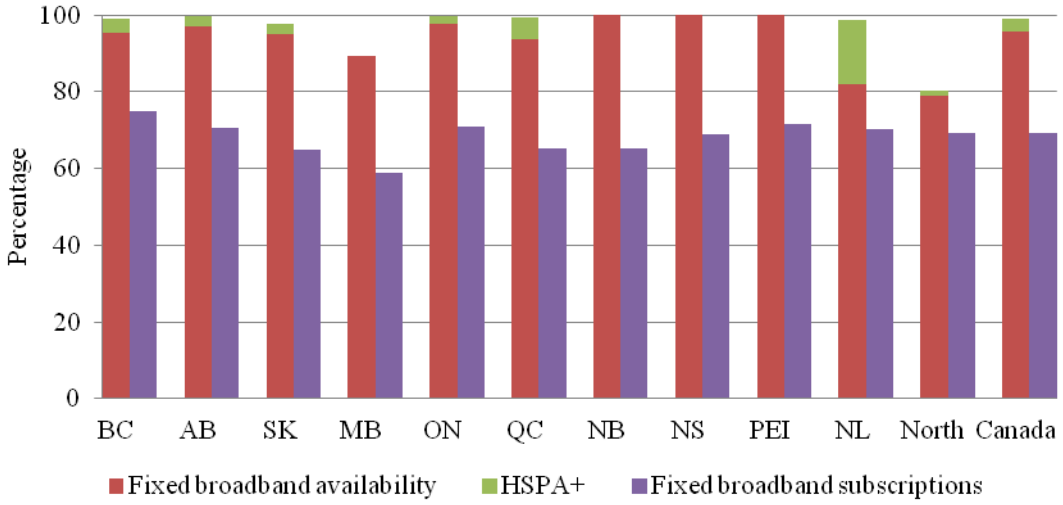
- Includes mobile and satellite funded projects

Source: Industry Canada

2.3 Broadband Internet access service penetration and usage

Broadband Internet access service is available to over 98% of households. Canadians are increasingly demanding access to content, whether audio, video, or data. Spurring this development is the availability of multi-function consumer devices.

Figure 2.3.1 Broadband availability v. broadband subscriptions (2010)



Source: Industry Canada and CRTC data collection

Broadband usage

As displayed in Table 2.3.1, Canadians, across all age groups, are increasingly using the Internet. Canadians are demanding higher speeds. In 2010, the majority (52%) of Canadian households subscribed to Internet download speeds of 5 Mbps or higher.

Table 2.3.1 Canadian Internet usage, by linguistic group

	2003		2005		2007		2009		2010	
	Anglo-phone	Franco-phone	Anglo-phone	Franco-phone	Anglo-phone	Franco-phone	Anglo-phone	Franco-phone	Anglo-phone	Franco-phone
Overall Usage	68%	58%	77%	65%	81%	71%	83%	76%	86%	79%
18-34	84%	79%	91%	86%	95%	91%	94%	93%	96%	97%
35-49	78%	66%	84%	76%	89%	84%	91%	88%	92%	90%
50+	48%	34%	60%	43%	66%	51%	69%	59%	74%	63%

- Note: Usage in past month

Source: MTM 2010-2011 (Respondents all 18+)

Table 2.3.2 provides examples of how Canadians use the Internet. For each example, the table provides the required bandwidth or speed, the percentage of households that can access that bandwidth, and the percentage of households that subscribe to that bandwidth.

Table 2.3.2 Internet applications – Bandwidth requirements

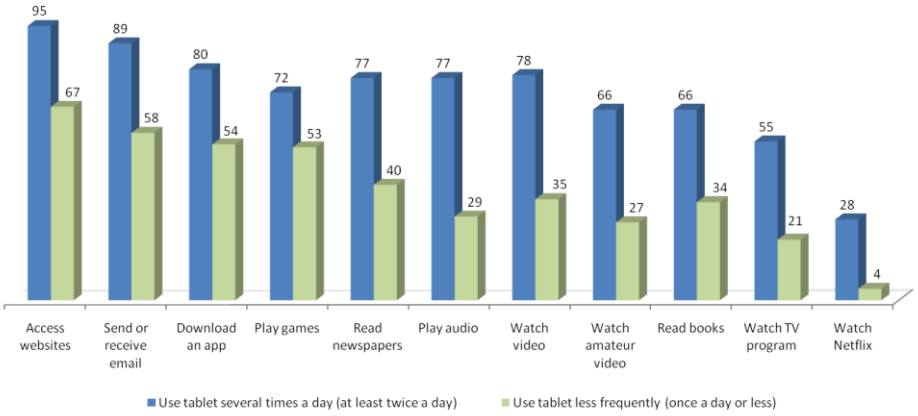
Examples of service/activity	Required bandwidth	Percentage of households	
		Availability of speed	Subscribing to speed
E-mails, web surfing	64 Kbps	99	77
Small software downloads	128 Kbps	96	74
Music downloads, web video	1.5 Mbps	96	70
Movie rental/purchase, standard definition IPTV	5 Mbps	86	52
Blu-ray size video, HD IPTV	16 Mbps	77	2

Source: CRTC

Canadians have a multitude of devices to access the Internet, from desktop computers to small advanced handheld devices. Tablet computers have recently entered the market. In less than a year, tablet awareness is already high. Over 9 in 10 Canadians have heard of the Apple iPad or other kinds of tablets. Five percent of Canadians have bought one. Fifty-one percent of tablet owners use a WiFi-only Internet connection, while 39% use 3G.[10]

Tablets are used for many media-related activities. The chart below indicates the percentage of tablet users over the age of 18 who use their tablet at least twice a day for particular media-related activities and the percentage of users who use their tablet less frequently for these activities. For example, 78% of tablet users watch video at least twice a day and 55% of tablet users watch TV programs at least twice a day.

Figure 2.3.2 Tablet activities (Percentage)

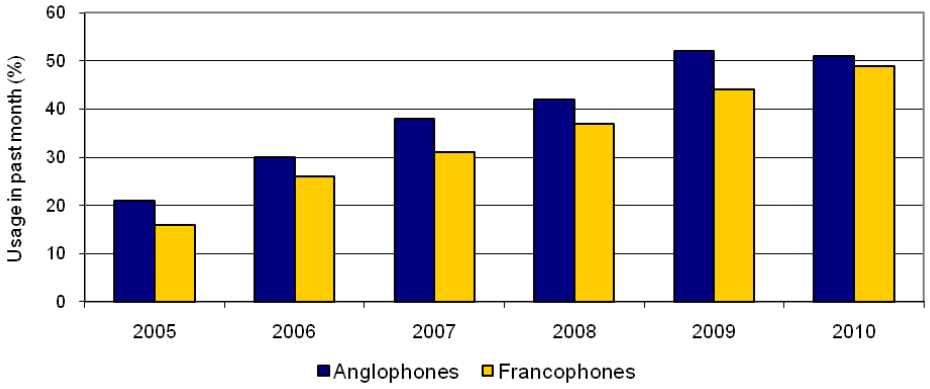


Source: Media Technology Monitor – Spring 2011 Mini Report (Users 18+)

[10] Source: Media Technology Monitor – Spring 2011 Mini Report (Users 18+)

As displayed in Figures 2.3.3 and 2.3.4, approximately 50% of Canadians over the age of 18, whether Anglophone or Francophone, viewed videos, including entire 30 or 60 minute full-length television programs on the Internet in 2010.

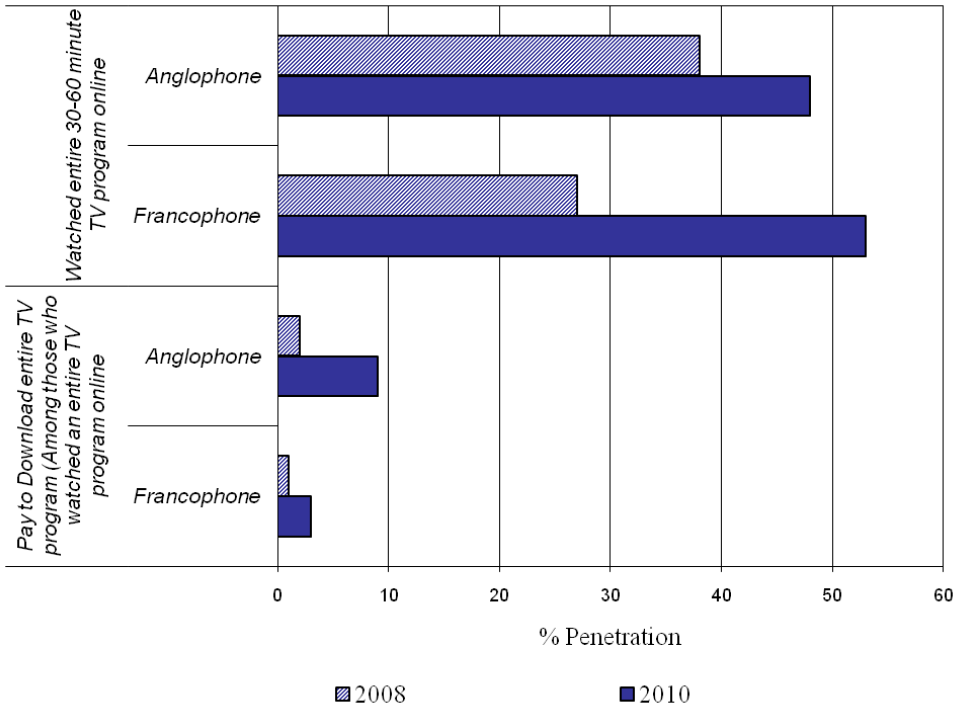
Figure 2.3.3 Canadian Internet video viewing, by language



- Watched video available on the Internet such as TV program, newscast or amateur video clip in the past month.

Source: MTM 2010-2011 (Respondents: All 18+)

Figure 2.3.4 Percent of Internet TV viewers of full-length TV programs



- Usage in past month

Source: MTM 2010-2011 (Respondents all 18+)

As displayed in Table 2.3.3, approximately 45% of households subscribed to broadband service with a download speed between 5 to 9 Mbps and an upload speed of 870 Kbps in 2010.

Table 2.3.3 Residential Internet plans

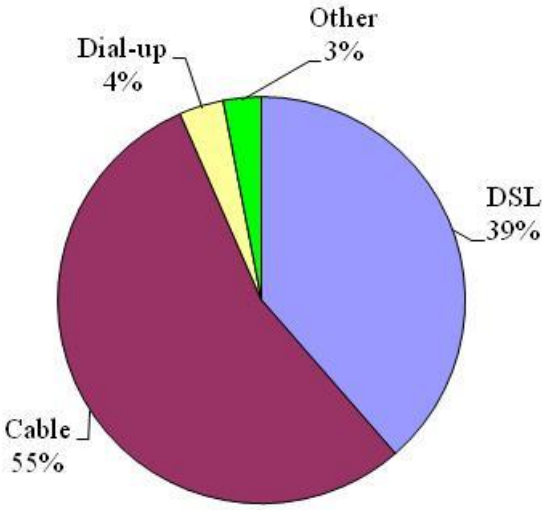
	2006	2007	2008	2009	2010
Downstream speed	Subscribers (%)				
Lite and wideband up to 256 Kbps	10.1%	10.0%	4.3%	1.1%#	0.3%
Wideband 300 to 1400 Kbps	14.7%	15.3%	19.8%	12.2%#	5.8%
Broadband					
1.5 to 4.9 Mbps	15.1%	15.3%	17.0%	24.5%#	24.2%
5 to 9.9 Mbps	54.8%	52.5%	50.1%	42.6%#	45.3%
10 to 15.9 Mbps	5.2%	6.8%	8.6%	19.0%#	22.4%
16 to 100 Mbps	0.1%	0.1%	0.2%	0.6%	2.0%
Total sample	6,880.3	7,576.6	8,184.4	8,516.8#	8,983.1
Downstream speed	Weighted-average upload speed (Kbps)				
Lite and wideband up to 256 Kbps	94	118	131	152#	209
Wideband 300 to 1400 Kbps	306	294	286	267#	352
Broadband					
1.5 to 4.9 Mbps	537	537	809	656#	584
5 to 9.9 Mbps	619	677	744	723#	870
10 to 15.9 Mbps	742	815	862	751	797
16 to 100 Mbps	1,006	1,000	1,120	1,085	1,735
Total sample	514	552	649	652#	769
Weighted-average download speed	3,826	4,227	4,928	5,945#	7,060
Downstream speed	Weighted-average upload/download limit[1] in gigabytes (GBs)				
Lite and wideband up to 256 Kbps	-	-	8.50	11.75	-
Wideband 300 to 1400 Kbps	-	-	8.75	3.04	7.20
Broadband					
1.5 to 4.9 Mbps	-	-	43.25	32.20	22.13
5 to 9.9 Mbps	-	-	54.18	42.80	45.27
10 to 15.9 Mbps	-	-	80.81	69.53	74.28
16 to 100 Mbps	-	-	101.91	104.14	112.94
Total sample	-	-	42.34	40.32	45.04

1. Weighted average download limits are calculated only for those plans that have limits.

Source: CRTC data collection

As set out in Figure 2.3.5, excluding mobile broadband subscribers, the majority (55%) of Internet access subscribers use a cable modem connection compared to 39% that use a DSL connection, and less than 3% for fixed-wireless.

Figure 2.3.5 Residential Internet access technology mix (2010)

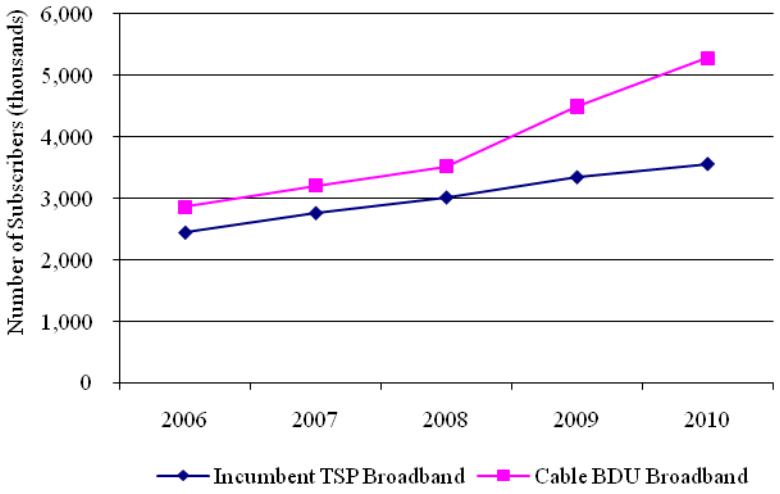


- Mobile broadband subscriptions are excluded

Source: CRTC data collection

As displayed in Figure 2.3.6, the number of households that subscribe to cable modem service has been increasing more quickly than the number of households that subscribe to DSL service. A contributing factor for this preference is the higher download speeds of cable modem.

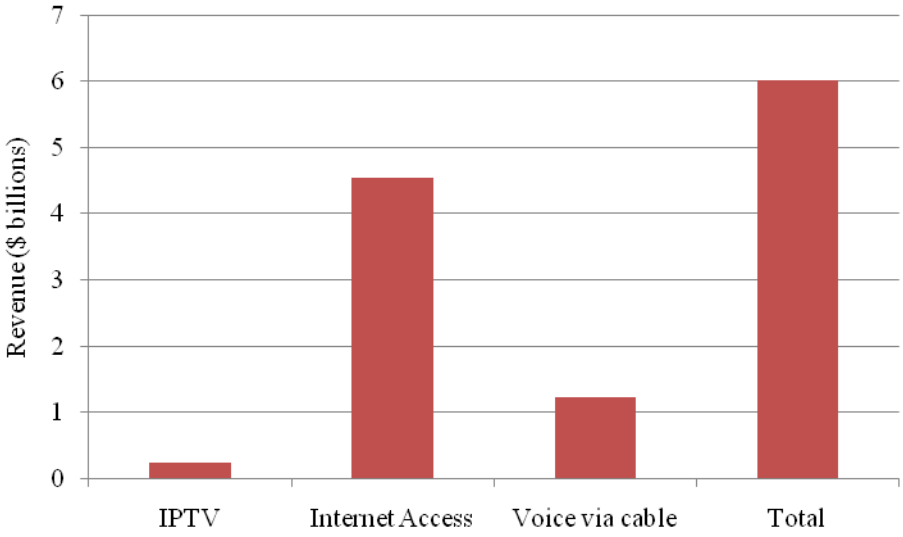
Figure 2.3.6 Broadband (1.5 Mbps and higher) Internet access subscriptions



Source: CRTC data collection

IP has increased consumer choice across a number of communications services. Traditional telephone and cable companies have benefitted from increased revenues from Internet access services. The technology has also spurred the development of a modern, cost-efficient network that is capable of supporting multiple services: broadcast distribution undertaking (BDU) type of services, telephony, and new media services. Figure 2.3.7 displays the revenues generated in 2010 from a number of IP-based services.

Figure 2.3.7 Residential Internet Protocol provisioned service revenues (2010)



Source: CRTC data collection